

# MONTANA FISH, WILDLIFE AND PARKS 352 I-94 BUSINESS LOOP MILES CITY, MONTANA 59301

## DRAWING INDEX

### TITLE

CVR COVER SHEET

### MECHANICAL

M1.1 DEMO AND NEW PIPING  
M2.1 MECHANICAL LEGEND AND SCHEDULES

### ELECTRICAL

E1.1 DEMO AND NEW ELECTRICAL  
E2.1 ELECTRICAL LEGEND AND SCHEDULES



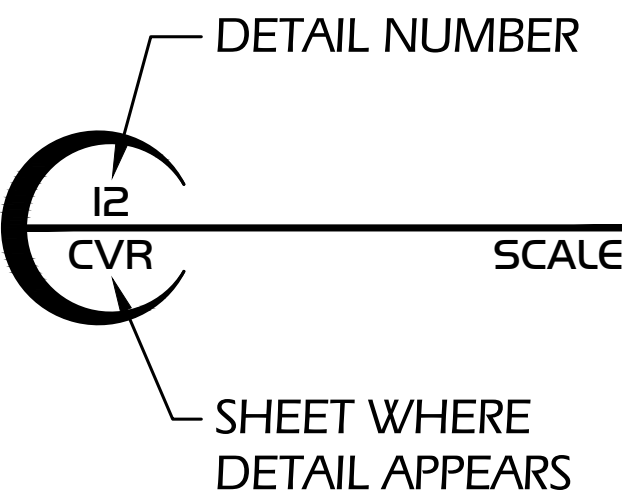
## PREPARED By



MECHANICAL \ ELECTRICAL  
PROFESSIONAL ENGINEERS  
1629 AVE D STE 7C, BILLINGS MT 59102  
PHONE: 406.252.3237 FAX: 406.252.3276  
www.coneer.com



## TYPICAL SHEET LAYOUT



## PROJECT INFORMATION

PROJECT LOCATION  
Montana Fish, Wildlife and Parks  
352 I-94 Business Loop  
Miles City, Montana 59301

Date : 04-28-2020

Project : #20011

Set # : \_\_\_\_\_

CVR



- DEMO PIPING WORK NOTES
- 1

REMOVE AAO WATER-WATER HEAT PUMP FOR REPLACEMENT. REMOVAL TO INCLUDE ALL SPARE SUPPORTS, CONTROLS, WIRING, ETC.
- 2

REMOVE CIRCULATION PUMPS AS INDICATED.
- 3

REMOVE PIPING AS INDICATED.
- 4

REMOVE ELECTRIC WATER HEATER FOR RELOCATION.
- 5

CONCRETE SUPPORT PAD TO REMAIN. PAD TO BE MODIFIED FOR NEW EQUIPMENT.
- 6

ATTIC MOUNTED WATER-AIR HEAT PUMP TO REMAIN.
- 7

ZONE CIRCULATION PUMP TO REMAIN.
- 8

REMOVE SYSTEM EXPANSION TANK FOR REPLACEMENT.

- LINETYPE LEGEND
- DARK SOLID LINES, NEW WORK.

LIGHT SOLID LINES, EXISTING TO REMAIN.

DARK DASHED LINES, EXISTING TO BE REMOVED.

- NEW PIPING WORK NOTES
- 1

INSTALL NEW FLOOR MOUNTED WATER SOURCE HEAT PUMP. LOCATE AS TIGHT TO WELL FIELD MANIFOLD AS POSSIBLE.
- 2

VERTICAL STORAGE TANK WITH AIR VENT.
- 3

FLOOR MOUNTED EXPANSION TANK.
- 4

HOSE END CONNECTION FOR SYSTEM PRIMING.
- 5

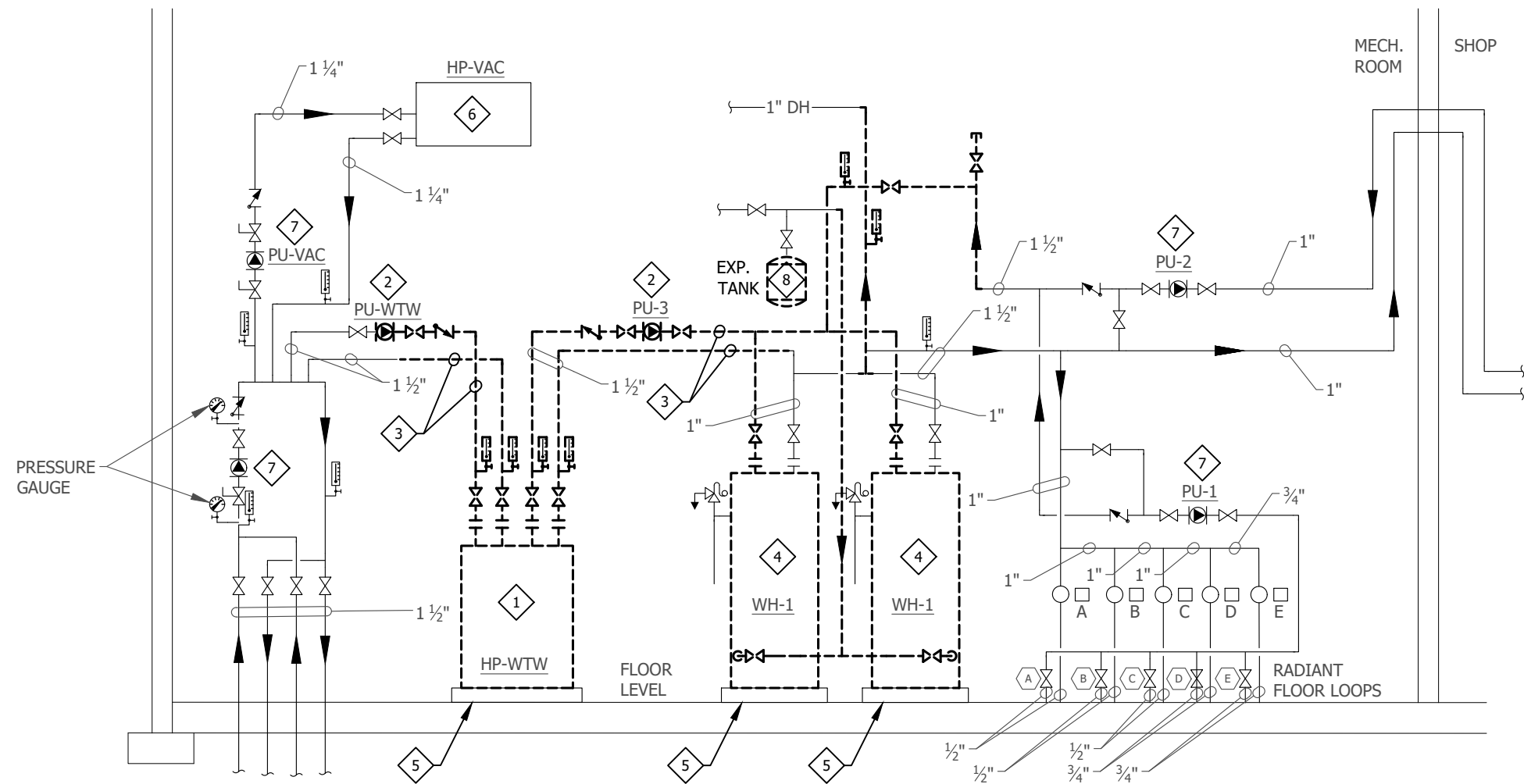
NEW IN-LINE CIRCULATION PUMP SEE SCHEDULE.
- 6

PROVIDE ISOLATION VALVE ON ALL STORAGE TANK CONNECTIONS.
- 7

TRANSITION TO NEW PIPE SIZE AT ISOLATION VALVE.
- 8

SIZE RELIEF VALVE BASED ON HEAT PUMP PERFORMANCE.
- 9

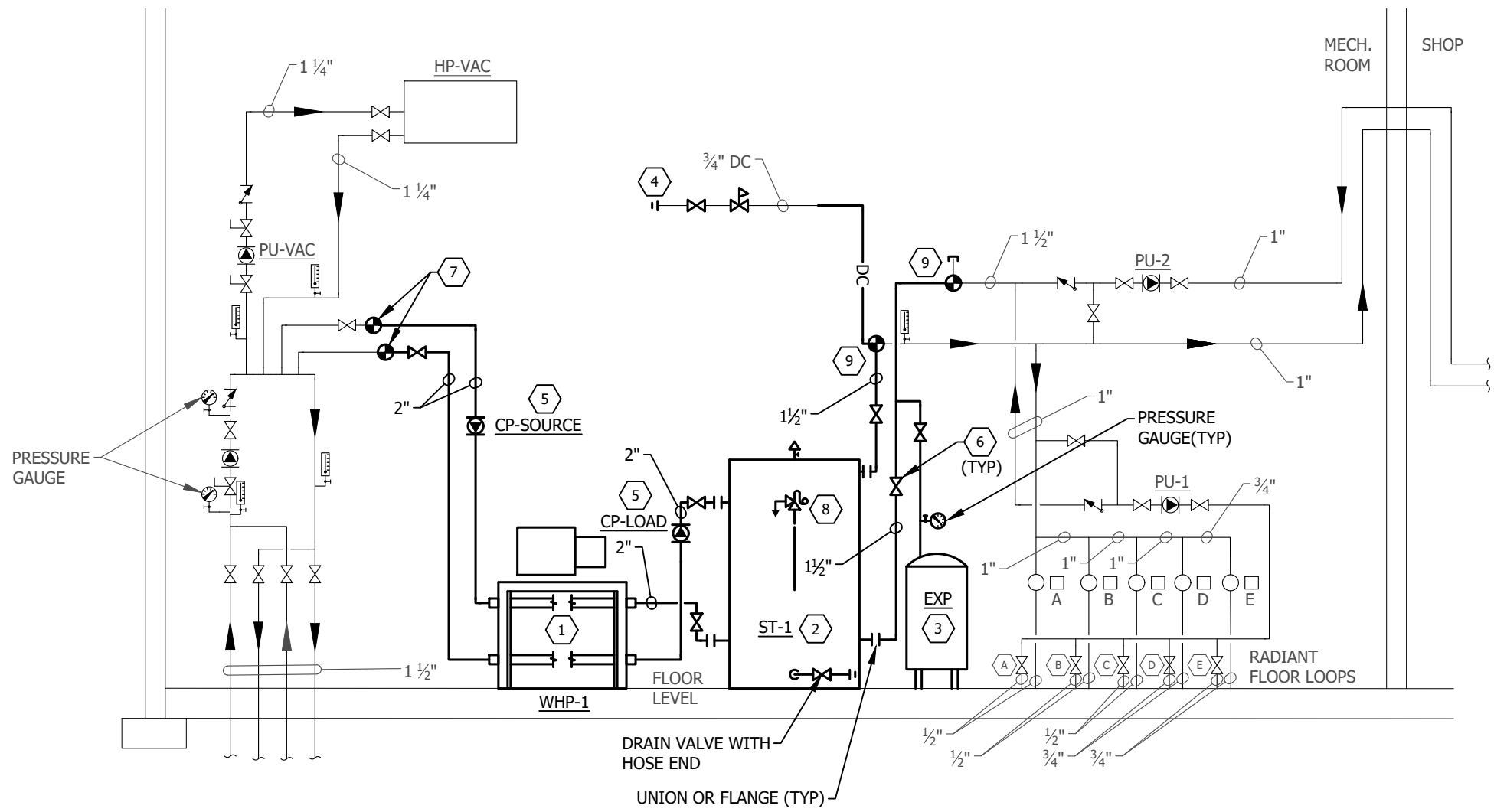
CONNECT TO EXISTING PIPING AS SHOWN.



1

DEMO PIPING DIAGRAM

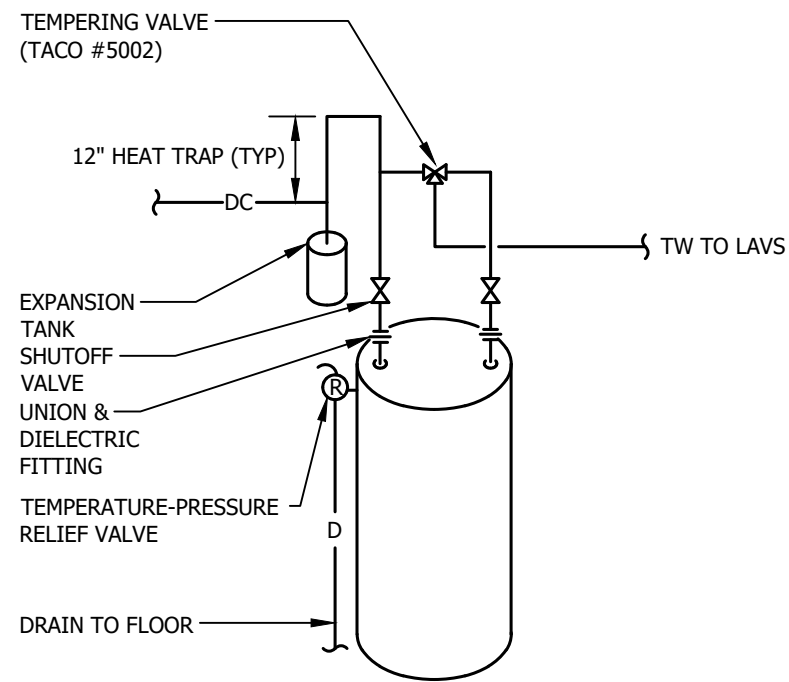
SCALE: NTS



2

NEW PIPING DIAGRAM

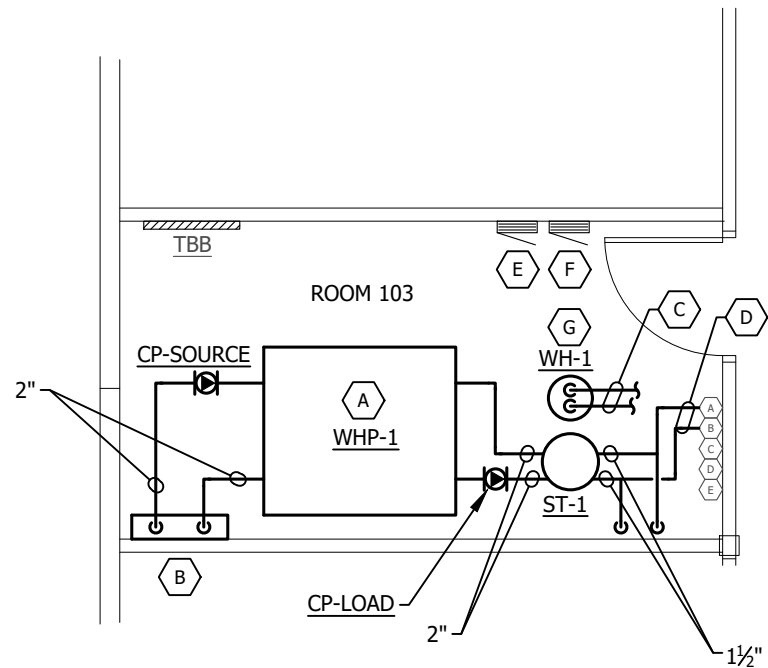
SCALE: NTS



3

WATER HEATER

SCALE: NTS



- FLOOR PLAN WORK NOTES
- A

FLOOR MOUNTED HEAT PUMP.
- B

WELL FIELD MANIFOLD.
- C

EXTEND 1" DC AND DH PIPING TO EXISTING CONNECTIONS.
- D

REUSE LOAD SIDE PIPING WHERE APPLICABLE.
- E

EXISTING PANEL 'A'.
- F

EXISTING PANEL 'B'.
- G

REPLACE UNIT WITH SCHEDULED EQUIPMENT PER DETAIL.
- H

IN-LINE CIRCULATION PUMP SEE SCHEDULE.

4

LOWER MECH. ROOM - PIPING

SCALE: 3/16" = 1'-0"

CONVEER ENGINEERING, INC.

PROFESSIONAL ENGINEER

1629 AVE D STE 7C, BILLINGS, MT 59102

PHONE 406.252.3277 FAX: 406.252.3276

WWW.CONVEER.COM

CONVEER ENGINEERING, INC.

MECHANICAL ELECTRICAL PROFESSIONAL ENGINEERS

1629 AVE D STE 7C, BILLINGS, MT 59102

PHONE 406.252.3277 FAX: 406.252.3276

WWW.CONVEER.COM

BY

DATE

REVISION

#

MONTANA

FISH, WILDLIFE AND PARKS

MILES CITY, MONTANA

DEMO AND NEW PIPING

DRAWN: RLK

DESIGNED: JAG

CHECKED: JAG

#20011

04-28-2020

M1.1

MECHANICAL LEGEND					
XX-#	UNIT DESIGNATION	①	THERMOSTAT	Ⓢ	SENSOR
☒	SUPPLY AIR DUCT RISER	▣	RETURN AIR DUCT RISER	☒	EXHAUST AIR DUCT RISER
☒	SUPPLY AIR DUCT DROP	▣	RETURN AIR DUCT DROP	☒	EXHAUST AIR DUCT DROP
☒	SUPPLY AIR DIFFUSER	▣	RETURN AIR GRILLE	☒	EXHAUST AIR GRILLE
▬	SUPPLY AIR DUCT	▬	RETURN AIR DUCT	▬	EXHAUST AIR DUCT
▬	TURNING VANES	▬	FLEXIBLE CONNECTION	▬	OUTSIDE AIR DUCT
100S1 68	CFM-GRILLE/SIZE	▬	LINEAR DIFFUSER	▬	DUCT DAMPER
	FLEXIBLE DUCT	⊙	FIRE EXTINGUISHER	▬	VAV BOX W/HEAT
Ⓟ	PLUMBING FIXTURE	Ⓜ	WATER METER	▬	FLOOR DRAINS
Ⓟ	PLUMBING FIXTURE ABOVE	Ⓜ	GAS METER	▬	ELBOW TURNED DOWN
▬	ELBOW TURNED UP	▬	TEE OUTLET UP	▬	END OF LINE CLEANOUT
▬	TEE OUTLET DOWN	▬	GRADE CLEANOUT	▬	END CAP
▬	WALL HYDRANT	▬	ROOF DRAIN	▬	UNION
▬	VALVE IN RISER	▬	VALVE IN DROP	▬	FLEXIBLE CONNECTION
▬	PIPE GUIDE	▬	PIPE ANCHOR	▬	THREE WAY VALVE
▬	STRAINER	▬	SHUT-OFF VALVE	▬	BALANCING VALVE
▬	CHECK VALVE	▬	PRESSURE REDUCING VALVE	▬	PLUG VALVE
▬	CONTROL VALVE	▬	GLOBE VALVE	▬	MOTORIZED VALVE
▬	BUTTERFLY VALVE	▬	RELIEF VALVE	▬	INLINE PUMP
▬	BACKFLOW PREVENTER	▬	CURB STOP	▬	FLOW SWITCH
▬	THERMOMETER	▬	AIR VENT	▬	WATER HAMMER ARRESTOR
▬	PRESSURE GAUGE	▬	CONNECT TO EXISTING	▬	TW → TEMPERED WATER
▬	DOM. COLD WATER	▬	DH → DOM. HOT WATER	▬	DR → DOM. HOT WATER RECIRC.
▬	WATER SERVICE	▬	S → SANITARY SEWER	▬	ST → STORM SEWER
▬	VENT	▬	D → DRAIN	▬	G → NATURAL GAS
▬	HWS → HEATING WATER SUPPLY	▬	HWR → HEATING WATER RETURN	▬	C → CONDENSATE
▬	CWS → CHILLED WATER SUPPLY	▬	CWR → CHILLED WATER RETURN	▬	CA → COMPRESSED AIR
▬	CTS → COOLING TOWER SUPPLY	▬	CTR → COOLING TOWER RETURN	▬	HG → REFRIGERANT HOT GAS
▬	RL → REFRIGERANT LIQUID	▬	RS → REFRIGERANT SUCTION	▬	HOSE → FIRE HOSE CABINET
▬	F → FIRE SERVICE	▬	FD → FIRE DEPT. CONNECTION	▬	W → DRY SIDEWALL SPRINKLER HEAD
● WET ○ DRY	SEMI-RECESSED SPRINKLER HEAD	● WET ○ DRY	UPRIGHT/PEN. SPRINKLER HEAD	▼ WET ▼ DRY	POST FIRE DEPT. CONN.
● WET ○ DRY	CONCEALED SPRINKLER HEAD	■ WET ☒ DRY	VANDAL PROOF SPRINKLER HEAD		

ABBREVIATIONS					
ABV	ABOVE	EQUIP	EQUIPMENT	NO	NORMALLY OPEN
AFF	ABOVE FINISHED FLOOR	FCO	FLOOR CLEANOUT	OS&Y	OUTSIDE SCREW AND YOKE
BD	BALANCING DAMPER	FD	FIRE DAMPER	PLBG	PLUMBING
BDD	BACKDRAFT DAMPER	FDC	FIRE DEPARTMENT CONNECTION	PSI	POUNDS PER SQUARE INCH
CI	CAST IRON	FE	FIRE EXTINGUISHER	REQD	REQUIRED
CONTR	CONTRACTOR	FLR	FLOOR	RF	RETURN FAN
CONN	CONNECTION	FP	FIN PIPE RADIATION	RH	REHEAT
CFH	CUBIC FEET PER HOUR	FPM	FEET PER MINUTE	RPM	REVOLUTIONS PER MINUTE
CFM	CUBIC FEET PER MINUTE	PSD	FIRE/SMOKE DAMPER	SD	SMOKE DAMPER
CH	CABINET HEATER	GPM	GALLONS PER MINUTE	SF	SUPPLY FAN
CP	CIRCULATING PUMP	GALV	GALVANIZED	SPEC	SPECIFICATIONS
CT	COOLING TOWER	HP	HORSE POWER	SPKR	SPRINKLER
CU	CONDENSING UNIT	HG	MERCURY	SHC	SPRINKLER HEAD CONCEALED
DTL	DETAIL	KW	KILOWATT	SHP	SPRINKLER HEAD PENDANT
DWG	DRAWING	LAT	LEAVING AIR TEMPERATURE	SHR	SPRINKLER HEAD RECESSED
DIA	DIAMETER	LOC	LOCATION	SHSW	SPRINKLER HEAD SIDEWALL
DN	DOWN	LWT	LEAVING WATER TEMPERATURE	SHU	SPRINKLER HEAD UPRIGHT
DEMO	DEMOLITION	MAU	MAKE UP AIR UNIT	SOV	SHUT OFF VALVE
EF	EXHAUST FAN	MAX	MAXIMUM	SP	STATIC PRESSURE
EX	EXISTING	MBH	BTU PER HOUR (1000)	TYP	TYPICAL
EFD	EXISTING FLOOR DRAIN	MD	MOTORIZED DAMPER	VAV	VARIABLE AIR VOLUME
EAT	ENTERING AIR TEMPERATURE	MECH	MECHANICAL	VEL	VELOCITY
EWT	ENTERING WATER TEMPERATURE	MFR	MANUFACTURER	V	VENT
ENGR	ENGINEER	MIN	MINIMUM	VTR	VENT THROUGH ROOF
ENT	ENTRANCE	MTG	MOUNTING	W/	WITH
EMERG	EMERGENCY	NC	NORMALLY CLOSED	WCO	WALL CLEANOUT
		NIC	NOT IN CONTRACT		

EXPANSION TANK SCHEDULE											
CODE	MANUFACTURER & MODEL NO.	SYSTEM VOLUME	FILL PRESSURE	RELIEF PRESSURE	VOL.	ACCEPTANCE	FILL PRESSURE	DIAMETER	HEIGHT	WEIGHT	REMARKS
EXP-1	TACO CBX 84-125	350	12	30	22	12	12	16"	38 3/4"	150#	ASME RATED, PROVIDE DRAIN VALVE

HEAT PUMP SCHEDULE													
LOCATION		DESCRIPTION		PERFORMANCE							ELECTRICAL		
MARK	AREA	MAKE	SIZE	GPM	COOL BTUH	HEAT BTUH	EER/ COP	FLUID	EWTLWT	WPD	TONS	VOLT/ϕ	MCA/ MOP
WSHP-1	SHOP	MULTISTACK MR015XN2	015	SOURCE	46.9	-	174	20.8/ 3.2	20% P	65/78	10.7	20.6	208/3
				LOAD	45				WATER	56/45	9.5/ 8.4	21.0	
ACCESSORIES: 1. ECM VARIABLE SPEED MOTOR WITH ELECTRONIC PROTECTION. 2. POLYMER DRAIN PAN. 3. MOTORIZED WATER VALVE WITH HOSE KIT INCLUDING AUTO-FLOW DEVICE. 4. ON/OFF SWITCH. 5. PROVIDE 2-SETS OF REPLACEABLE PLEATED FILTER MEDIA.													

PUMP SCHEDULE												
MARK	MANUFACTURER & MODEL NO.	SYSTEM	TYPE	GPM	HEAD	SIZE	IMPELLER	EFFICIENCY	ELECTRICAL			
									H.P.	R.P.M.	VOLT	PHASE
CP - LOAD	GRUNDFOS TPE	HEAT PUMP	VARIABLE	45	18	40 - 80	-	53.62	0.334	2995	208	1
CP - SOURCE	GRUNDFOS TPE	HEAT PUMP	VARIABLE	45	18	40 - 80	-	53.62	0.334	2995	208	1

STORAGE TANKS SCHEDULE									
MARK	LOCATION	MANUFACTURER AND MODEL	STORAGE CAPACITY	LINER	DIA.	HEIGHT	WEIGHT	WORKING PRESSURE	REMARKS
ST-1	EQUIPMENT ROOM	LOCHINVAR RBT119	119	GLASS	29.5"	61.625"	198#	125	SEE DETAIL FOR PIPING REQUIREMENTS
REMARKS: 1. 2" PIPE CONNECTIONS.									

WATER HEATER SCHEDULE									
MARK	LOCATION	MANUFACTURER AND MODEL	STORAGE	FUEL	INPUT	ELEC.	MIXING VALVE	EXPANSION TANK	REMARKS
WH-1	MECHANICAL	LOCHINVAR K54H40JDBW	38	ELEC.	4000W	208V - 1P	HONEYWELL AM-1	WATTS FLT-5	SEE DETAIL FOR PIPING REQUIREMENTS
REMARKS: 1. VENT WITH 3" EXTEND VENTS OUTSIDE INDICATED ZONE. 2. UNIT EQUIPPED RECIRC. PUMP.									

CONFER

MECHANICAL ELECTRICAL PROFESSIONAL ENGINEERS

1629 AVE D STE 7C BILLINGS MT 59102

PHONE 406.252.3237 FAX 406.252.3276

WWW.CONFER.COM

CONFER

MECHANICAL ELECTRICAL PROFESSIONAL ENGINEERS

1629 AVE D STE 7C BILLINGS MT 59102

PHONE 406.252.3237 FAX 406.252.3276

WWW.CONFER.COM

#	REVISION	DATE	BY

MONTANA

FISH, WILDLIFE AND PARKS

MILES CITY, MONTANA

MECHANICAL  
LEGEND AND  
SCHEDULES

DRAWN: RLK  
DESIGNED: JAG  
CHECKED: JAG

#20011

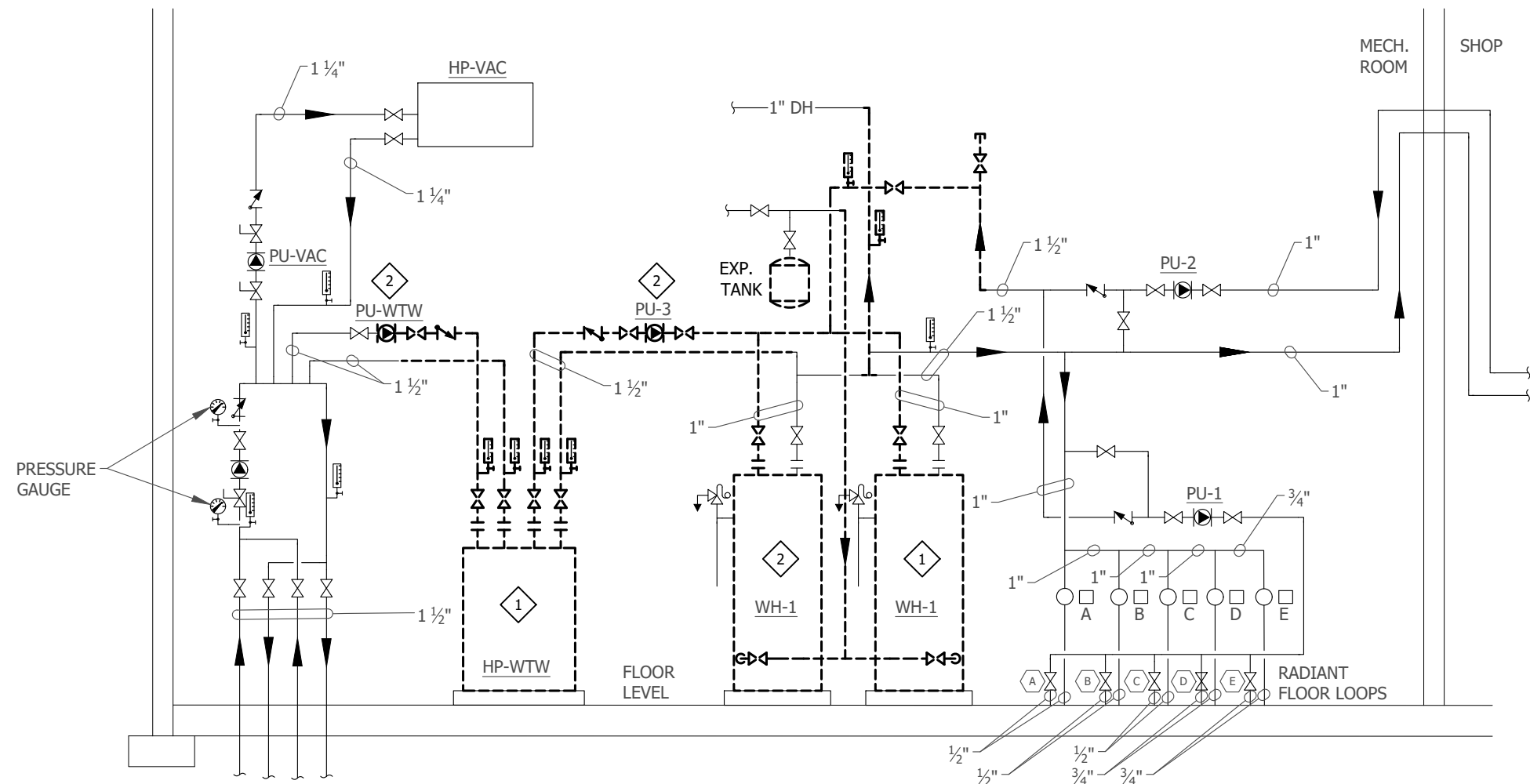
04-28-2020

M2.1

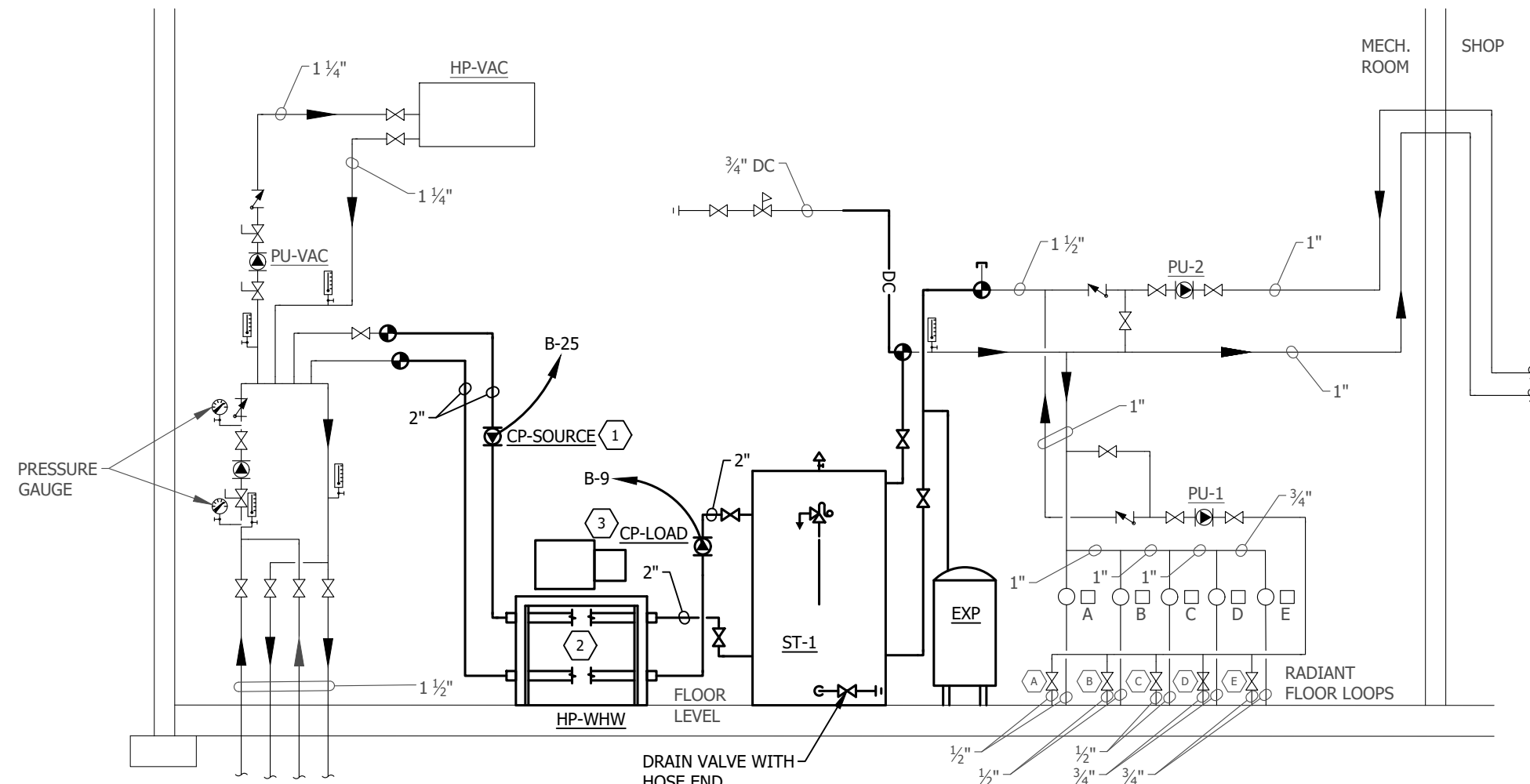
DEMO ELECTRICAL WORK NOTES
1 REMOVE CIRCUIT TO PANEL 'B' WIRE/CONDUIT COMPLETE.
2 DISCONNECT POWER TO MECHANICAL EQUIPMENT TO REPLACEMENT.

LINETYPE LEGEND
DARK SOLID LINES, NEW WORK.
LIGHT SOLID LINES, EXISTING TO REMAIN.
DARK DASHED LINES, EXISTING TO BE REMOVED.

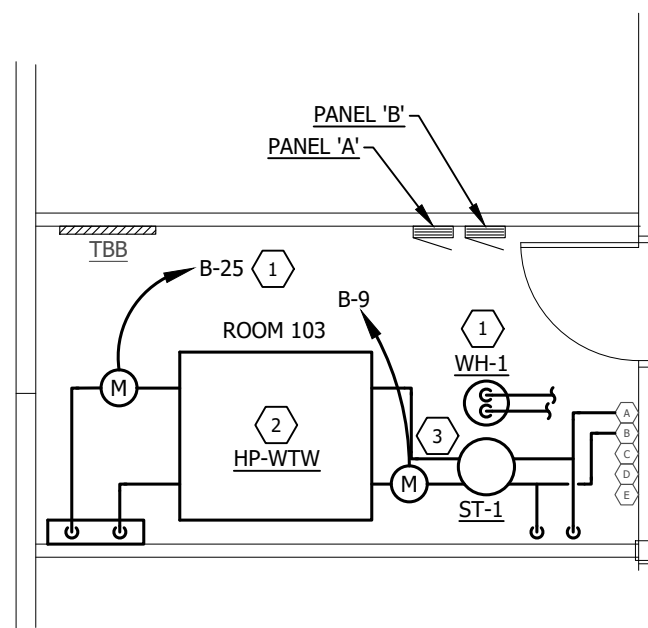
NEW ELECTRICAL WORK NOTES
1 EXTEND POWER TO NEW MECHANICAL EQUIPMENT. SEE CONTROL EQUIPMENT SCHEDULE FOR AUX. EQUIPMENT.
2 EXTEND NEW CIRCUIT FROM PANEL 'A', PROVIDE NEW BREAKER PER SCHEDULE.
3 EXTEND CIRCUIT FROM PANEL 'B'. PROVIDE BREAKER AND AUX. EQUIPMENT PER SCHEDULE.



1 DEMO ELECTRICAL DIAGRAM  
SCALE: NTS



2 NEW ELECTRICAL DIAGRAM  
SCALE: NTS



3 LOWER MECH. ROOM - ELECTRICAL  
SCALE: 3/16" = 1'-0"



MECHANICAL ELECTRICAL  
PROFESSIONAL ENGINEERS  
1629 AVE D STE 7C, BILLINGS, MT 59102  
PHONE 406.252.3277 FAX: 406.252.3276  
WWW.CONVEER.COM



BY	DATE	REVISION	#

MONTANA  
FISH, WILDLIFE AND PARKS  
MILES CITY, MONTANA

DEMO AND  
NEW ELECTRICAL

DRAWN: RLK  
DESIGNED: JAG  
CHECKED: JAG

#20011

04-28-2020

E1.1



ELECTRICAL LEGEND			
	HOMERUN TO PANEL; NUMBER OF ARROWS INDICATES NUMBER OF CIRCUITS		VARIABLE FREQUENCY DRIVE
	NUMBER OF HASH MARKS INDICATES NUMBER OF CONDUCTORS IN CONDUIT, EXCLUDING GND. NO HASH MARKS INDICATES 2 CONDUCTORS AND GND.		VARIABLE FREQUENCY DRIVE/DISCONNECT
	TELEPHONE LINE		TRANSIENT VOLTAGE SUPPRESSION SYSTEM
	POWER LINE		MUSHROOM BUTTON
	POWER PANEL		PUSH BUTTON
	ENCLOSED CIRCUIT BREAKER		WEATHERHEAD
	CT CABINET		TELEPHONE, PRIVATE
	TELEPHONE TERMINATION BOARD		DATA
	WIREWAY		DATA/COMMUNICATION OUTLET
	TRANSFORMER		DOUBLE DATA/COMMUNICATION OUTLET, MOUNTED IN A DOUBLE GANG ELECTRICAL BOX
	METER		FLOOR RECEPTACLE
	DISCONNECT		SUBSCRIPT: T-TELE, D-DATA, P-POWER
	STARTER/DISCONNECT		CLOCK
	RECEPTACLE, DUPLEX		OCCUPANCY SENSOR
	RECEPTACLE, 2" FROM TOP OF BACKSPLASH TO BOTTOM OF RECEPTACLE		OCCUPANCY SENSOR, NUMBER DESIGNATES SETTING IN MINUTES
	RECEPTACLE, 220V		ULTRASONIC DETECTOR
	RECEPTACLE, QUADRUPLEX		INFRARED DETECTOR
	RECEPTACLE, SIMPLEX		TIME CLOCK
	RECEPTACLE, SPLIT WIRED		TELEVISION
	EQUIPMENT CONNECTION		INTERCOM
	MOTOR		SPEAKER
	THERMOSTAT		WALL SPEAKER
	PHOTOCCELL		BELL
	PULLBOX		BUZZER
	TELEPHONE/POWER POLE		HANDICAP
	JUNCTION BOX		AMPLIFIER
			SECURITY CAMERA
			CONTACTOR
			FAN
			GROUND
			SWITCH, SPST.
			SWITCH, 3-WAY
			SWITCH, 4-WAY
			SWITCH, DIMMER
			SWITCH, DOUBLE THROW
			SWITCH, KEYED
			SWITCH, MOTOR STARTER, FRACTIONAL HP
			SWITCH, W/ PILOT LIGHT
			SWITCH, WALL MOUNTED OCCUPANCY SENSOR
			SWITCH, TIME DELAY
			SWITCH, SWEEP SWITCH (RESET)
			FIRE ALARM MANUAL PULL STATION
			FIRE ALARM, AUDIO
			FIRE ALARM, VISUAL
			FIRE ALARM, AUDIO/VISUAL
			SINGLE STATION SMOKE ALARM, AUDIO/VISUAL
			SINGLE STATION CARBON MONOXIDE AND SMOKE ALARM, AUDIO/VISUAL
			ANNUNCIATOR
			FIRE ALARM PANEL
			FLOW SWITCH
			TAMPER SWITCH
			SMOKE DETECTOR
			SMOKE DETECTOR, DUCT
			HEAT DETECTOR
			HEAT DETECTOR, DUCT
			MAGNETIC DOOR HOLDER
			MAGNETIC DOOR HOLDER W/LEG
			TRANSPONDER

ABBREVIATIONS			
AFF	ABOVE FINISHED FLOOR	DWG	DRAWING
AIC	AMPS INTERRUPTING CURRENT	EC	ELECTRICAL CONTRACTOR
ARCH	ARCHITECT	EQ	EQUIP
AFCI	ARC FAULT INTERRUPTER	EX	EXISTING
ATS	AUTOMATIC TRANSFER SWITCH	EXP	EXPLOSION PROOF
C	CONDUIT	FLR	FLOOR
CTR	COUNTER	GFI	GROUND FAULT INTERRUPTER
CU	COPPER	GND	GROUND
DTL	DETAIL	HP	HORSEPOWER
DISC	DISCONNECT	HOA	HAND-OFF-AUTO
DIST	DISTRIBUTION	KW	KILOWATT
DEMO	DEMOLITION	LOC	LOCATION
DN	DIAMETER	MAX	MAXIMUM
	DOWN	MCC	MOTOR CONTROL CENTER
MDP	MAIN DISTRIBUTION PANEL		
MECH	MECHANICAL		
MFR	MANUFACTURER		
MIN	MINIMUM		
PVC	POLYVINYL CHLORIDE		
RGS	RIGID GALVANIZED STEEL		
SCH	SCHEDULE		
SPEC	SPECIFICATIONS		
TYP	TYPICAL		
VFD	VARIABLE FREQUENCY DRIVE		
W	WATT		
W/	WITH		
WP	WEATHERPROOF		
XFMR	TRANSFORMER		

ELECTRICAL GENERAL CONDITIONS			
SCOPE: ALL ELECTRICAL WORK UNDER THIS CONTRACT AS SHOWN ON THE PLANS AND INDICATED IN THE SPECIFICATIONS. WORK SHALL BE PERFORMED BY A LICENSED AND BONDED CONTRACTOR UTILIZING TRADESMEN SKILLED IN THE ART AND IN ACCORDANCE WITH ACCEPTABLE PRACTICES. ALL WORK SHALL COMPLY WITH LOCAL, STATE AND THE NATIONAL ELECTRICAL CODE 2014 EDITION.			
PERMITS: THE ELECTRICAL CONTRACTOR SHALL SECURE ALL PERMITS IN CONNECTION WITH HIS WORK.			
WORK INCLUDED: ALL LIGHTING AND POWER SYSTEMS INCLUDING FIXTURES, DEVICES, BOXES, CONDUIT, DISCONNECTS, MOTOR STARTERS, ETC. PROVIDE AND INSTALL ALL INCIDENTAL ITEMS REQUIRED FOR A COMPLETE AND FUNCTIONING SYSTEM. SERVICE EQUIPMENT, MOTORS, ETC., TO BE LOCATED AND INSTALLED AS SHOWN ON THE PLAN AND PER UTILITY REQUIREMENTS. DEVIATIONS SHALL BE APPROVED BY THE ARCHITECT AND/OR ENGINEER PRIOR TO INSTALLATION.			
TESTS: PRIOR TO TESTS OR USAGE, ALL SWITCHES, PANELS, DEVICES SHALL BE IN PLACE. ALL BRANCH CIRCUITS SHALL BE FREE OF FAULTS OR SHORTS. THE COMPLETE INSTALLATION AND ALL COMPONENTS SHALL HAVE A RESISTANCE BETWEEN CONDUCTORS AND GROUND AS SPECIFIED BY THE NATIONAL ELECTRIC CODE (N.E.C.)			
GROUND: THERE SHALL BE CONTINUITY OF GROUND THROUGHOUT THE SYSTEM. SYSTEM GROUND TO COMPLY WITH N.E.C. REQUIREMENTS.			
MATERIALS: ALL MATERIALS SUCH AS RECEPTABLES, SWITCHES, CONDUIT, CONDUCTORS, PANEL BOARDS, DEVICES, FIXTURES, ETC., SHALL BE NEW, AND SHALL BEAR THE UL LABEL OR CONFORM TO APPLICABLE STANDARDS. ALL MULTIPLES OF EQUIPMENT SUCH AS RECEPTABLES & SWITCHES SHALL BE BY THE SAME MANUFACTURER.			
SUBSTITUTIONS: MATERIALS LISTED ARE REPRESENTATIVE OF THE QUALITY DESIRED. THOSE REQUESTING MATERIALS APPROVAL TO SUBMIT TWO (2) COPIES IN BROCHURE FORM W/TABS INDICATING MATERIALS SUCH AS LIGHT FIXTURES, MOTOR STARTERS, SWITCH GEAR, DISCONNECTS, ETC. OWNER/ENGINEER TO DETERMINE MATERIALS ACCEPTABILITY.			
SUBMITTALS: WITHIN 30 DAYS AFTER CONTRACT IS AWARDED. ELECTRICAL CONTRACTOR TO SUBMIT IN BROCHURE FORM SHOP DRAWINGS ON ELECTRICAL EQUIPMENT USED ON THIS PROJECT. THEY ARE TO INCLUDE BUT NOT LIMITED TO LIGHT FIXTURES, MOTOR STARTERS, DISCONNECTS, SWITCH GEAR, TRANSFORMERS, WIRING DEVICES, ETC. PROVIDE TAB FOR EACH SECTION.			
BROCHURE OF EQUIPMENT AND OWNER INSTRUCTIONS: CONTRACTOR TO PROVIDE THE OWNER WITH A THREE (3) RING BINDER CATALOG CONTAINING CATALOG CUTS OR MANUFACTURERS' LITERATURE ON ELECTRICAL MATERIALS USED ON THE PROJECT. LISTING INCLUDES, BUT IS NOT LIMITED TO, BREAKERS, SWITCHES, OUTLETS, LIGHTING FIXTURES, DISCONNECTS, MOTOR STARTERS, ETC. INSTRUCT OWNER AS TO FUNCTION, OPERATION, MAINTENANCE, ADJUSTMENT OF EQUIPMENT AND SYSTEMS INSTALLED.			
GUARANTEE/WARRANTY: CONTRACTOR GUARANTEES THAT ALL WORK AND PLANT WILL BE FREE FROM DEFECTS OF MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE (1) YEAR FROM THE DATE OF FINAL ACCEPTANCE. CONTRACTOR FURTHER AGREES THAT HE WILL REPLACE OR REPAIR ALL DEFECTIVE EQUIPMENT AND INSTALLATION THAT BECOMES DEFECTIVE DURING THE TERM OF THE WARRANTY. THIS DOES NOT INCLUDE EXCESSIVE ABUSE OR DAMAGE INFLECTED BY THE OWNER AND/OR OTHERS.			
MANUFACTURERS' DIRECTIONS, PROCEDURES AND OPERATING INSTRUCTIONS: MANUFACTURER'S MATERIALS AND EQUIPMENT TO BE APPLIED, INSTALLED, CONNECTED, ERECTED, USED, CLEANED, AND CONDITIONED AS PER MANUFACTURER'S DIRECTIONS OR RECOMMENDATIONS PRIOR TO INSTALLATION.			
DEMOLITION: REMOVE AND RECYCLE ALL ABANDONED CONDUIT AND WIRE.			

ELECTRICAL MATERIALS AND INSTALLATION			
INSTALLATION: ALL EQUIPMENT, CIRCUITRY, ETC. SHALL BE UL LISTED AND INSTALLED PER NEC, AS FOLLOWS OR AS SPECIFIED OTHERWISE. THE ELECTRICAL CONTRACTOR SHALL VERIFY ALL NAMEPLATE RATINGS OF EQUIPMENT TO BE CONNECTED AND VERIFY ELECTRICAL COMPATIBILITY AND NEC COMPLIANCE. MANUFACTURER'S RECOMMENDATIONS SHALL TAKE PRECEDENCE UNLESS VERIFIED OTHERWISE.			
LIGHTING CIRCUITS: LIGHTING CIRCUITS SHALL NOT EXCEED 1600 WATTS AT 120V OR 3600 WATTS AT 277V AND SHALL BE FOR LIGHTING ONLY. NO OTHER EQUIPMENT SUCH AS RECEPTABLES, SMALL MOTORS, COMPUTERS, AND OTHER DEVICES SHALL BE CONNECTED TO LIGHTING CIRCUITS UNLESS SPECIFICALLY SHOWN ON THE PLAN OR CALLED OUT IN THE SPECIFICATIONS.			
RECEPTACLE CIRCUITS: THERE SHALL BE NO MORE THAN SIX (6) RECEPTABLES ON A 20A CIRCUIT OR AS INDICATED ON THE PLAN. ADDITIONAL LOADS SUCH AS SMALL MOTORS OR EQUIPMENT MAY BE CONNECTED TO RECEPTACLE CIRCUITS IF INDICATED ON THE PLANS. FIELD VERIFY FOR ANY DEVIATIONS.			
MOTOR CIRCUITS: MOTORS AND CIRCUITRY TO BE INSTALLED AND CONNECTED AS INDICATED ON THE PLAN. ALL MOTORS TO BE PROVIDED WITH A DISCONNECTING MEANS PER THE N.E.C. IF FRACTIONAL HORSEPOWER MOTORS DO NOT HAVE AN INTEGRAL DISCONNECTING MEANS SUCH AS A PLUG OR SNAP SWITCH, ELECTRICAL CONTRACTOR TO PROVIDE AND INSTALL AN ACCEPTABLE DISCONNECTING MEANS. EQUIPMENT CONNECTED WITH FLEXIBLE CONDUIT WITH GREEN JACKETED GROUND WIRE WITHIN CONDUIT-TO CONDUIT SYSTEM OR EQUIPMENT GROUND. PROVIDE LIQUID-TIGHT FLEX FOR MOTORIZED EQUIPMENT IN MECHANICAL ROOMS AND EXTERIOR. VERIFY CORRECT ROTATION.			
CONDUITS: CONDUIT USED THROUGHOUT CONSTRUCTION INCLUDING LOW VOLTAGE, EXCEPT MC CABLE MAY BE USED WHERE SPECIFIED, EMT FOR 4" AND UNDER. COMPRESSION COUPLINGS IN WET LOCATIONS AND IN CONCRETE WALLS AND FLOORS. CLAMP ANCHOR TO STRUCTURE. CONDUIT IN EXTERIOR WALLS TO BE EMT. EMT TO BE USED FOR FEEDERS, FOR MOTORS OVER 1 HP, AND WHERE EXPOSED IN BACKROOMS AND MECHANICAL ROOMS TO FEED SURFACE-MOUNTED EQUIPMENT. PVC SCHEDULE 40 ACCEPTABLE WHERE ROUTED UNDERGROUND EXCEPT SCHEDULE 80 UNDER VEHICLE TRAFFIC AND PARKING AREAS. IF PVC IS USED, PROVIDE GROUND WIRE. NO PVC CONDUIT TO BE INSTALLED ABOVE GRADE.			
MC CABLE: MC CABLE IS ALLOWED FOR USE ON 120V, 20A LIGHTING AND POWER CIRCUITS WHERE CONCEALED ABOVE AN ACCESSIBLE CEILING AND IN INTERIOR WALLS. MC CABLE MAY NOT ENTER PANELBOARDS DIRECTLY. SUPPORT MC CABLE SO IT DOES NOT LIE ON CEILING.			
OUTLET BOXES: BOXES TO BE GALVANIZED STEEL SECURELY FASTENED TO THE STRUCTURE AND/ OR EQUIPMENT. LOCATE FIXTURE OUTLETS ON CENTER OF SPACES AND BAYS OR WHERE INDICATED ON THE PLAN. SWITCHES TO BE LOCATED ON LOCK SIDE OF DOOR. ALL EQUIPMENT DIRECTLY CONNECTED TO BRANCH CIRCUITS THROUGH SPECIAL PURPOSE OUTLET BOXES. PROVIDE BLANK PLATES AND ACCEPTABLE FITTINGS FOR ALL CONDUIT CONNECTIONS. FIXTURE AND SPECIAL PURPOSE: 4"x4"x2½" DUPLEX, SWITCH AND TELEPHONE: 3"x2"x2½" SPECIAL PURPOSE OUTLET: 4"x4"x2½"			
WIRE AND CABLE: ALL CONDUCTORS SHALL BE COPPER WITH A WEATHER RESISTANT THERMOPLASTIC COVER. TYPE THHN OR THWN FOR APPLICATION OR AS NOTED OTHERWISE. TYPE AF FIXTURE WIRE WHERE REQUIRED INCLUDING WITHIN FLUORESCENT FIXTURES. NO BRANCH CIRCUIT CONDUCTORS SHALL BE SMALLER THAN #12 EXCEPT FOR LOW VOLTAGE WIRING. COLOR CODE IN ACCORDANCE WITH N.E.C.			
COMMUNICATIONS: TELEPHONE / DATA, TV & SECURITY EQUIPMENT, CONDUCTORS, PUNCH BLOCKS, SPLITTERS, HAND SETS, CONTROLS, ETC TO BE PROVIDED & INSTALLED BY OWNER &/OR VENDOR OF THE OWNER'S CHOICE. ELECTRICAL CONTRACTOR TO PROVIDE BACK BOARD, POWER SUPPLY, BOX & RACEWAY SYSTEM ONLY.			
CURRENT CHARACTERISTICS: 120/208V, 3ø, 4W, Y, OR 277/480V-Y, 3ø, 4W AS NOTED.			
WIRING DEVICES: PRODUCT: LEVITON, P&S, HUBBELL ACCEPTABLE. SWITCH AND RECEPTACLE DEVICES/FINISH PLATES TO MATCH IN COLOR - NO EXCEPTIONS. COLOR TO BE SELECTED BY THE ARCHITECT/OWNER.			
1. STANDARD SWITCH, SINGLE POLE TOGGLE: HUBBELL HBL 1221. 2. STANDARD SWITCH, 3-WAY TOGGLE: HUBBELL HBL 1223. 3. STANDARD SWITCH, 4-WAY TOGGLE: HUBBELL HBL 1224. 4. STANDARD SWITCH, DOUBLE POLE TOGGLE: HUBBELL HBL 1222. 5. STANDARD SWITCH, DOUBLE POLE W/ PILOT: HUBBELL HBL 1222PL, SINGLE POLE W/ PILOT HBL 1221PLC. 6. DUPLEX RECEPTACLE: HUBBELL HBL5362. 7. TAMPER RESISTANCE DUPLEX RECEPTACLE: HUBBELL HBL BR20TR. 8. TAMPER RESISTANCE SELF TESTING GFI DUPLEX RECEPTACLE: HUBBELL HBL GFTRST20. 9. 4-PLEX RECEPTACLE: HUBBELL HBL5362 (2 REQUIRED). 10. SELF TESTING GFI DUPLEX RECEPTACLE: HUBBELL GFRTS20. PROVIDE WEATHER RESISTANT "WHEN-IN-USE". COVER WHERE INDICATED "WP". 11. SWITCH, TIME DELAY: NCC (NATIONAL CONTROLS CORP.) MODEL T1517 FAN & LIGHT CONTROL. 12. SWITCH, OCCUPANCY SENSOR: LEVITON ODS10-1D. 13. TIME CLOCK #1 & #2: TORK MODEL NO. T930L, 3 CKT W/ ASTRO DIAL IN NEMA 1 ENCLOSURE. 14. PHOTO CELLS #1 & #2: TORK MODEL NO. 2101, 2000W@120V COMPLETE W/ SLIDE. 15. FLOOR BOX: HUBBELL MODEL 3SPBC COMPLETE W/ CARPET FLANGE & STEEL PLATE. 16. SPECIAL PURPOSE OUTLETS: ELECTRICAL CONTRACTOR TO VERIFY PLUG CONFIGURATIONS & PROVIDE NEMA 1 OUTLETS TO MATCH INCLUDING STAINLESS STEEL FINISH PLATE. 17. SWITCH DIMMER: LUTRON N-1000, RATED 1000W, GLIDE TYPE W/ WALL PLATE. PROVIDE DIMMER SWITCHES CONTROLLING FLUORESCENT LAMPS THAT ARE COMPATIBLE WITH THE FIXTURE BALLAST. 18. LIGHTING CONTACTORS: GE CR360 SERIES, 4 POLE RATED @ 30A. COIL TO OPERATE @ 120. CONTACTORS MECHANICALLY HELD & HOUSED IN NEMA 1 ENCLOSURE. 19. DOOR JAMB SWITCH: LEVITON 1865 RATED 15A @ 120V.			
PANEL BOARDS: PRODUCTS OF GENERAL ELECTRIC, SQUARE D, CUTLER HAMMER, AND SIEMENS ACCEPTABLE. DEADFRONT CIRCUIT BREAKER TYPE AS SCHEDULED. GALVANIZED STEEL BOX, FULL HEIGHT HINGED DOOR, FULLY BUSSED, BOLT-ON TYPE BREAKERS. PROVIDE TYPED CIRCUIT DIRECTORY. LOAD CENTER TYPE PANELBOARDS ARE NOT ACCEPTABLE.			
BREAKERS: TWO-POLE AND THREE-POLE TO HAVE INTERNAL COMMON TRIP.			
DISCONNECTS: PRODUCTS OF GENERAL ELECTRIC, SQUARE D, CUTLER HAMMER, AND SIEMENS ACCEPTABLE. MODEL, STYLE, ETC. AS SCHEDULED. INSTALL FUSES FOR DISCONNECTS IF REQUIRED AS RECOMMENDED BY EQUIPMENT SUPPLIER. COORDINATE CONTROLS WIRING AS INDICATED ON THE SCHEDULE AND MAKE ALLOWANCES THEREOF.			
MOTOR STARTERS AND SCHEDULE OF CONTROL EQUIPMENT: PRODUCTS OF GENERAL ELECTRIC, SQUARE D, CUTLER HAMMER, AND SIEMENS ACCEPTABLE. MODEL, STYLE, ETC. AS SCHEDULED WITH INTEGRAL OVERLOAD PROTECTION. INSTALL FUSES OR HEATERS AS RECOMMENDED BY MOTOR EQUIPMENT MANUFACTURER. COORDINATE ALL INTERLOCK OR CONTROL REQUIREMENTS WITH MECHANICAL AND/OR TEMPERATURE CONTROLS CONTRACTOR. MOUNT STARTERS ON OR ADJACENT TO EQUIPMENT PER N.E.C. REQUIREMENTS.			

CONTROL EQUIPMENT SCHEDULE																	
EQPT FURNISHED BY CONTR. SEE EQPT SCHED. &/OR SPEC.				STARTERS AND CONTROLS									AUXILIARY CONTROL EQUIPMENT				REMARKS
UNIT	MOTOR			INTEGRAL WITH EQPT	MANUFACTURER & TYPE	BRK/ FUSED	NEMA ENCLCS	NEMA SIZE	POLES	SWITCH	PILOT	CONTR'S: TC-TEMP CONTROL EC-ELEC, MC-MECH GC-GEN, ES-EQPT SUPPLIER					
	HP/ LOAD	VOLT	ø									ITEM	FURN	INST	CONN		
CP-LOAD	0.334	208	1	VFD	-	-	-	-	-	-	-	-	MC	EC	EC		
CP-SOURCE	0.334	208	1	VFD	-	-	-	-	-	-	-	-	MC	EC	EC		
WH-1	4KW	208	1	-	HUBBELL HBL3032PL	-	-	-	2	DPST	ON W/ LOAD	-	MC	EC	EC		
WSHP-1	80A	208	3	VFD	-	-	-	-	-	-	-	-	MC	EC	EC		

EXISTING PANEL: 'A'				LOCATION: ROOM 103			
MANUFACTURER	SQUARE D	FEED ENTRANCE	-	OCP	-		
TYPE	NQOD	VOLT, ø, W	120/208V, 3ø, 4W	CONNECTED	262.5A		
WIDTH	20"	BUS RATING	400A	MISC	-		
DEPTH	5½"	MAIN BRKR/MLO	MAIN BRKR	MISC	-		
MOUNTING	SURFACE	BREAKER AIC	22,000	MISC	-		
LOAD DESCRIPTION		CIRCUIT BREAKER	CKT #	PHASE A B C	CKT #	CIRCUIT BREAKER	LOAD DESCRIPTION
OFFICE 104 RECEPTACLE		20A/1P	1		2	20A/1P	OFFICE 102 RECEPTABLES
OFFICE 104 RECEPTACLE		20A/1P	3		4	20A/1P	OFFICE 101 RECEPTABLES
OFFICE 105 RECEPTACLE		20A/1P	5		6	20A/1P	STORAGE 109 RECEPTABLES
RESTROOM RECEPTABLES		20A/1P	7		8	20A/1P	SPARE
SHOP 112 RECEPTABLES		20A/1P	9		10	20A/1P	-
ARC WELDER		50A/2P	11		12	60A/2P	WIRE FEED WELDER
HOTSYS		30A/2P	13		14	30A/2P	SHOP 113 COMPRESSOR
OPEN 115 COOLER		30A/3P	15		16	20A/1P	ROOM 104 & 105 LIGHTING
			17		18	20A/1P	ROOM 101, 102, 103, 109, 108, 107, 111 LIGHTING
			19		20	20A/1P	ROOMS 114/115 RECEPTABLES
			21		22	20A/1P	AC1
			23		24	20A/1P	MEZZ. RECEPTABLES
SHOP 112 LIGHTING		20A/1P	25		26	20A/1P	EF3
115, 114, 113 LIGHTING		20A/1P	27		28	20A/1P	MEZZ. RECEPTABLES
LIGHTS		20A/1P	29		30	20A/1P	EF3
SPARE		20A/1P	31		32	20A/1P	GARAGE DOOR MOTOR
GARAGE DOOR MOTOR		20A/1P	33		34	20A/1P	OUTSIDE LIGHT
SHOP RECEPTABLES		20A/1P	35		36	20A/1P	SPARE
HALL 103		20A/1P	37		38	150A/3P	PANEL 'B'
PHONE BOARD		20A/1P	39		40		
SPARE		-	41		42		
① RELOCATE CIRCUIT TO PANEL 'B'.							
② RELOCATE CIRCUIT BREAKER TO PANEL 'B'.							

EXISTING PANEL: 'B'				LOCATION: ROOM 103					
MANUFACTURER		SQUARE D		FEED ENTRANCE		OCP			
TYPE		NQOD		VOLT, ø, W		CONNECTED			
WIDTH		20"		BUS RATING		116.7A			
DEPTH		5½"		MAIN BRKR/MLO		MISC			
MOUNTING		SURFACE		BREAKER AIC		MISC			
				22,000					
LOAD DESCRIPTION		CIRCUIT BREAKER	CKT #	PHASE A B C			CKT #	CIRCUIT BREAKER	LOAD DESCRIPTION
CIRC. PUMPS, LOOP, VAC, WTW		20A/1P	1				2	50A/3P	HP-WTW ①
CIRC. PUMPS PU-1, 2, 3		20A/1P	3				4		
WH-1		30A/2P	5				6		
			7				8	40A/3P	HP-VAC
HP - VAC ①		30A/2P	9				10		
			11				12		
HEAT PUMP CONTROL		20A/1P	13				14	20A/1P	P-3
EF-4 / HOOD		20A/1P	15				16	20A/1P	5, GARAGE DOOR OUTLET
SHOP 113 RECEPTACLES		20A/1P	17				18	20A/1P	CP-LOAD ①
SHOP 112 RECEPTACLES		20A/1P	19				20	20A/1P	HOIST
SHOP 113 RECEPTACLES		20A/1P	21				22	20A/1P	OUTSIDE RECEPTACLES
OUTSIDE LIGHT		20A/1P	23				24	20A/1P	113 SHOP RECEPTACLES
SPACE		-	25				26	20A/1P	113 SHOP RECEPTACLES
SPACE		-	27				28	20A/1P	112 SHOP RECEPTACLES
SPACE		-	29				30	20A/1P	OUTSIDE RECEPTACLES

① REMOVE LOAD TO BE REPLACED WITH NEW.